



HILLCREST HIGH SCHOOL

LIFE SCIENCES

GRADE 11

Life Science Exam Paper One

Examiner: Mr Mahabeer

Moderators: Mrs L. Prior
Mrs R. Harmse

TIME: 2 $\frac{1}{2}$ hours

MARKS: 120

Instructions:

1. Answer ALL the questions.
2. Write All the answers in the ANSWER BOOK.
3. Start the answers to EACH question at the top of a NEW page
4. Number the answers correctly according to the numbering system used in this question paper
5. Present your answers according to the instructions of each question
6. Make all drawings in pencil and label them in blue or black ink.
7. Draw diagrams, tables or flow charts only when asked to do so.
8. The diagrams in this question paper are not necessarily drawn to scale.
9. Do not use graph paper.
10. You must use a non-programmable calculator, protractor and a compass where necessary.
11. Write neatly and legibly.

SECTION A

Question 1

1.1 Various options are provided as possible answers to the following questions. Choose the correct answer and write only the letter (A -D) next to the question number (1.1.1 – 1.1.10) in the ANSWER BOOK, for example 1.1.11 D.

1.1.1 Plants absorb oxygen...

- A. Continuously
- B. During the day only
- C. During the night only
- D. During photosynthesis only

1.1.2 Which of the following substances can directly be absorbed by blood without further digestion?

- A. Proteins
- B. Starch
- C. Glucose
- D. Fats

1.1.3 The concentration of which of the following substances are normally higher in the hepatic portal vein than in most other veins in the human body?

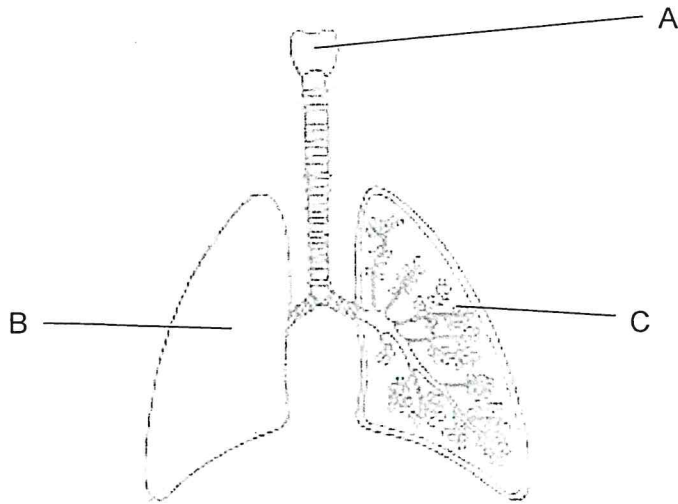
- A. Oxygen
- B. Glucose
- C. Urea
- D. Carbon dioxide

1.1.4 Which of the following are involved in the process of cellular respiration?

- 1. Energy
 - 2. Carbohydrates
 - 3. Carbon dioxide
 - 4. Water
 - 5. Oxygen
- A. 2 + 3 = 1 + 4 + 5
 - B. 2 + 4 = 1 + 3 + 5
 - C. 1 + 2 = 3 + 4 + 5
 - D. 2 + 5 = 1 + 3 + 4

1.1.5 A phase that forms part of cellular respiration is the...

- A. Krebs cycle
- B. Dark phase
- C. Light independent phase
- D. Light phase



1.1.6 Which of the following are represented by A, B and C?

- A. Larynx, trachea and diaphragm
- B. Intercostal muscle, bronchus and larynx
- C. Larynx, lung and alveolus
- D. Bronchiole, lung and alveolus

1.1.7 The role of carbon dioxide during photosynthesis is to...

- A. Supply elements from which organic compounds are built.
- B. Combine with water to form carbonic acid.
- C. Supply oxygen which is released as a by-product.
- D. Helps to form ATP molecules.

1.1.8 Which waste product is excreted by the skin, lungs and kidney?

- A. Urea
- B. Water
- C. Carbon dioxide
- D. Uric acid

1.1.9 Which of the following is part of the blood system found in the kidney?

- A. Glomerulus
- B. Convoluted tubules
- C. Loop of Henle
- D. Bowman's capsule

1.1.10 The rate of breathing is regulated by the medulla oblongata, mainly...

- A. Under voluntary control
- B. According to the oxygen levels in the blood
- C. According to blood pressure
- D. According to the carbon dioxide level of blood

[10x2 = 20]

1.2 Give the correct biological term for each of the following descriptions. Write only the term next to the question number (1.2.1 – 1.2.7) in the ANSWER BOOK, for example 1.2.8 Trachea.

1.2.1 The reagent used to test for the presence of starch.

1.2.2 The process by which glucose is converted to pyruvic acid.

1.2.3 Mucus secreting cells within the wall of the villus.

1.2.4 The photo-chemical splitting of water during photosynthesis.

1.2.5 The double membrane that covers the outer surface of the lungs.

1.2.6 The ejection of solid waste from the body.

1.2.7 The valve that controls the movement of chyme from stomach to the duodenum.

(7x1=7)

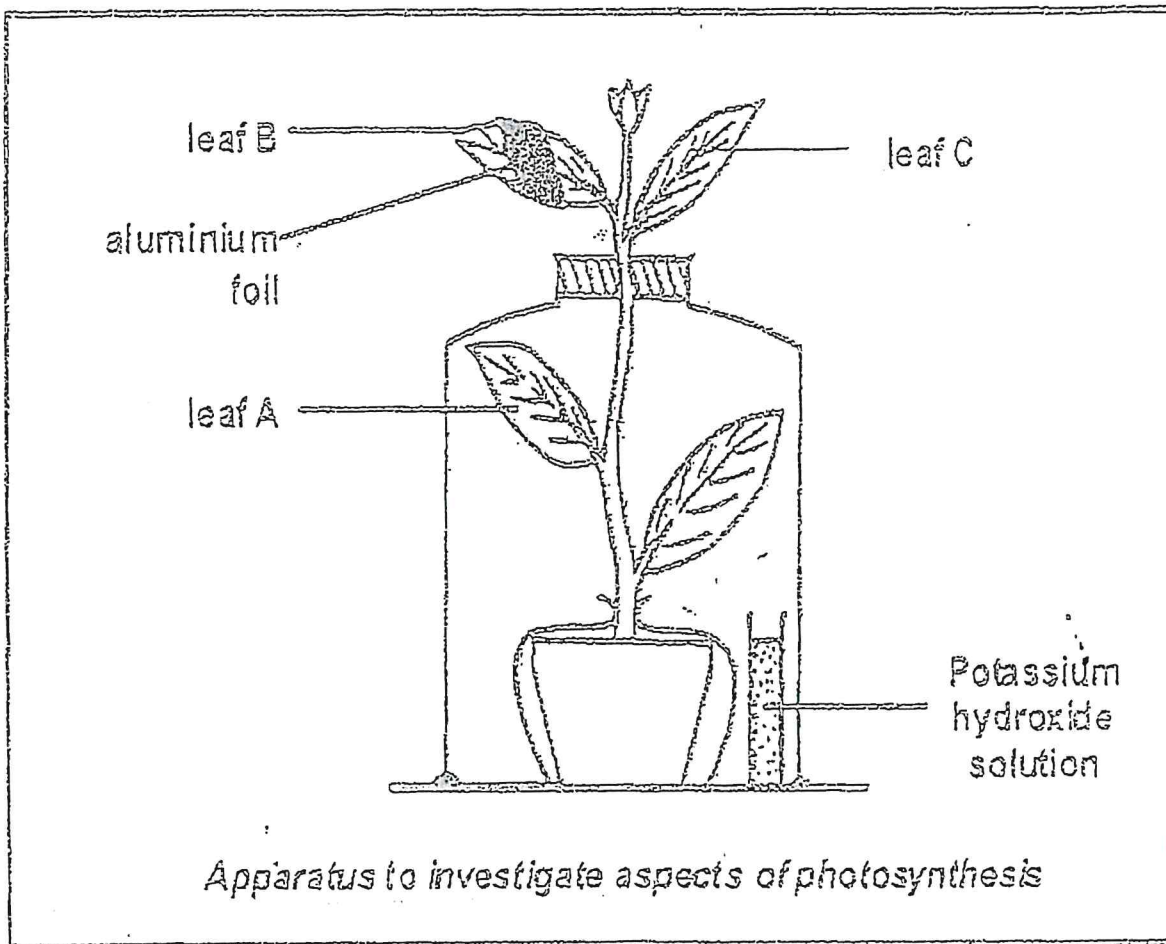
1.3 Indicate whether each of the statements in COLUMN A applies to **A only**, **B only**, **both A and B** or **None** of the items in COLUMN B. Write **A only**, **B only**, **both A and B** or **None** next to the question number (1.3.1 – 1.3.6) in the ANSWER BOOK.

	COLUMN A	COLUMN B
1.3.1	A lymph vessel in the villus of the intestine.	A. Lacteal B. Lymphatic node
1.3.2	The structure that prevents the passage of food particles in the lungs.	A. Epiglottis B. Glottis
1.3.3	Factor effecting the rate of photosynthesis.	A. Light B. Temperature
1.3.4	A product of cellular respiration which supplies energy needed for metabolic reactions in cells.	A. Oxygen B. ATP
1.3.5	A pair of ducts that convey urine to the bladder.	A. Ureter B. Urethra
1.3.6	Ways in which oxygen is transported in blood.	A. Dissolved in blood plasma B. Forms a compound with haemoglobin

[6x1=6]

1.4 The following diagram illustrates some investigation carried out on photosynthesis. The plant was kept in the dark for 48 hours before being placed in sunlight.

Study the diagram and then answer the questions that follow.



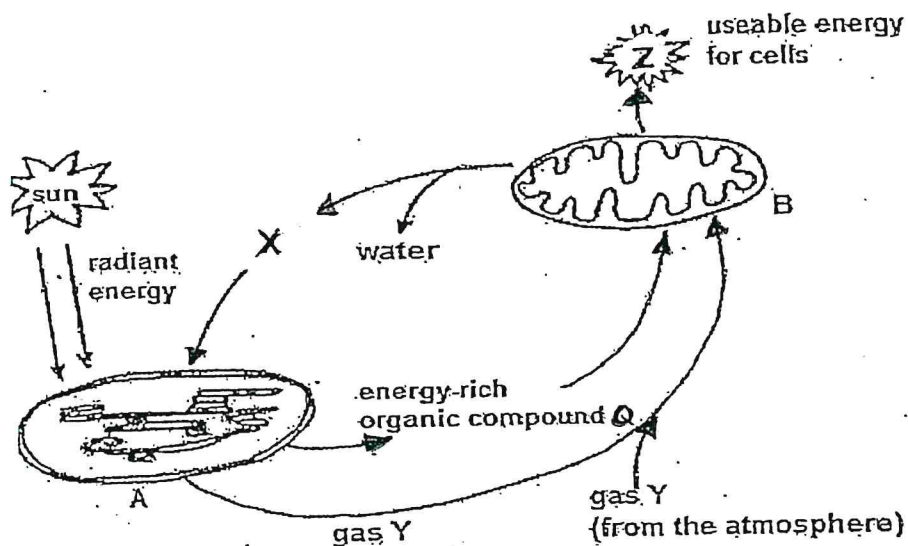
- 1.4.1 What is the aim of the investigation on leaf B? (2)
- 1.4.2 Why was the plant kept in the dark for 48 hours before being placed in sunlight? (1)
- 1.4.3 What would be the result on leaf B? (2)
- 1.4.4 Draw a simple diagram to illustrate the result in leaf B shading areas of starch (2)

[7]

TOTAL SECTION A: 40 MARKS

Question 2

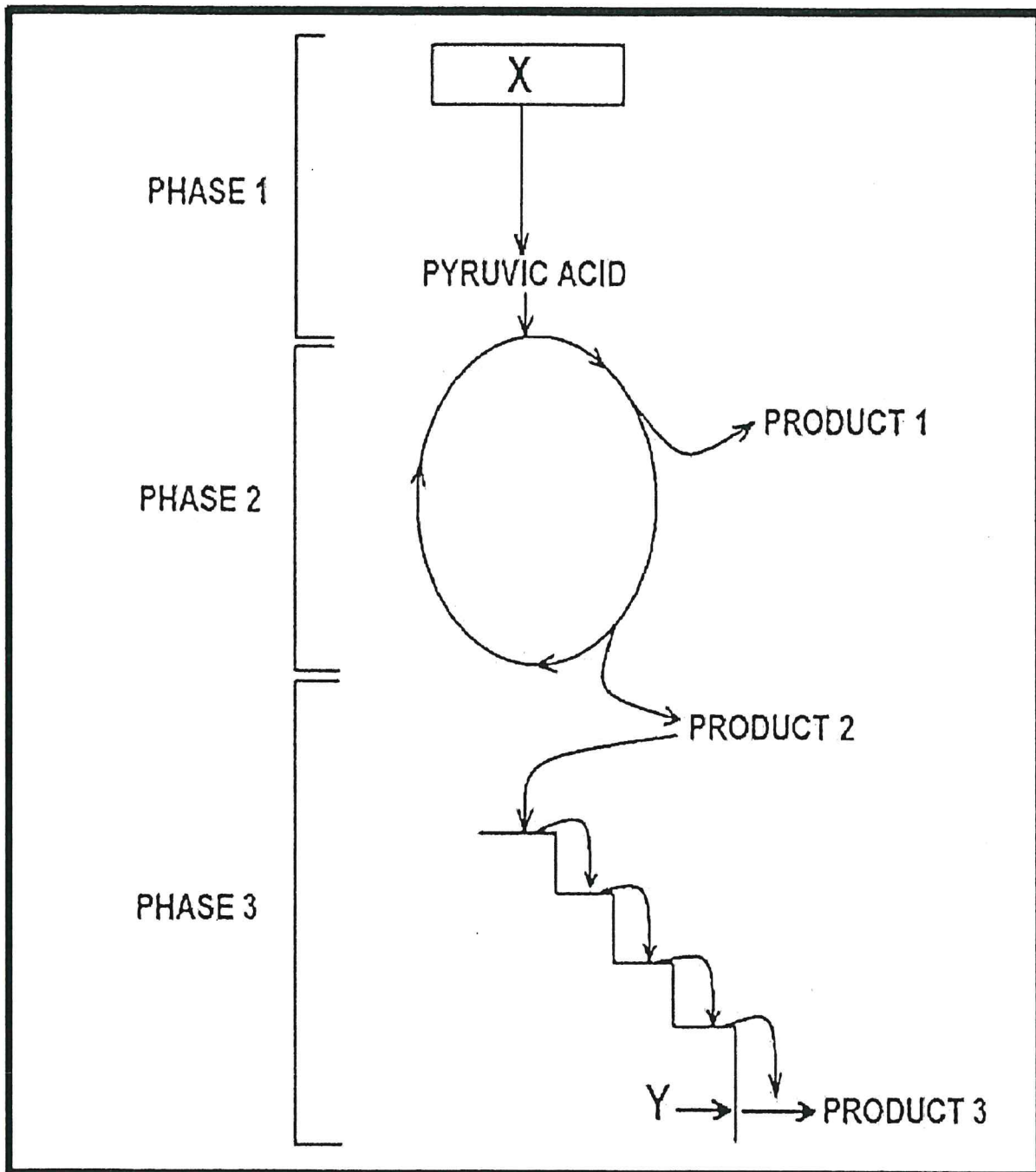
2.1 The diagram below represents the physiological processes that take place in the leaf of a green plant. Study the diagram and answer the questions that follow.



- 2.1.1 Name the organelles represented by A and B. (2)
- 2.1.2 Identify gases X and Y. (2)
- 2.1.3 Give **ONE** example of the energy-rich organic compound Q. (1)
- 2.1.4 In what form does the useable energy Z occur in cells? (1)
- 2.1.5 Explain why an increase in the concentration of Gas X may not necessarily lead to an increase in the process that takes place in organelle A. (2)
- 2.1.6 Explain how the processes taking place in organelles A and B help to maintain a constant composition of gases in the atmosphere. (2)
- 2.1.7 Describe the process that occurs during the light phase in organelle A. (4)

[14]

2.2 The diagram below represents aerobic respiration in humans. Study the diagram and answer the questions.



2.2.2 Identify phases 1, 2 and 3. (3)

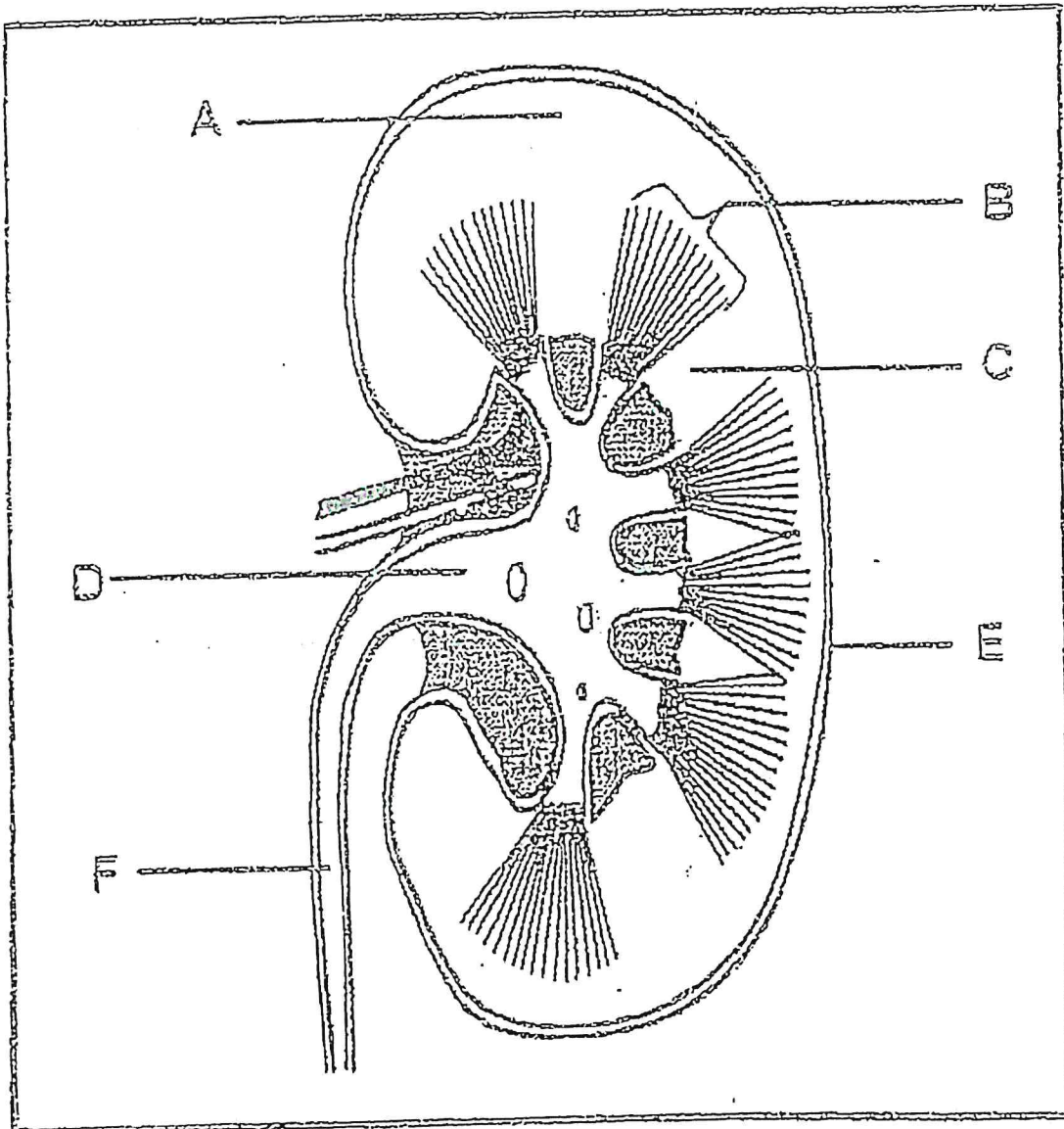
2.2.3 Name compound X and Y. (2)

2.2.4 a) Name the process that produces compound X. (1)

b) Name the compound that produces Y. (1)

[7]

2.3 Study the diagram below and answer the questions that follow.



2.3.1 Name the organ represented in the diagram. (1)

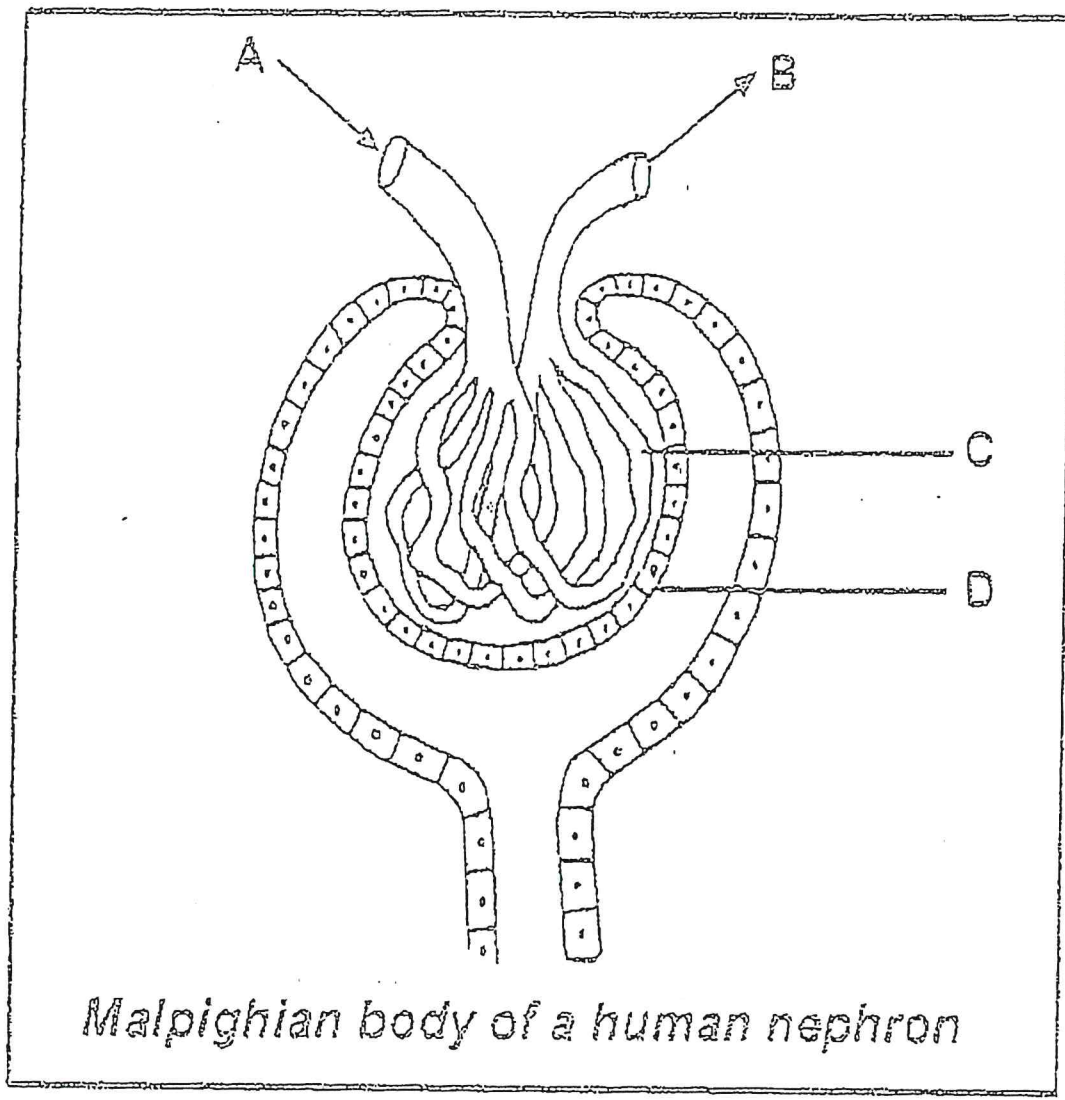
2.3.2 Identify region A and parts B and D. (3)

2.3.3 Give the function of each of the following parts:

- a) E (1)
- b) F (1)

2.3.4 Give THREE functions of the organ named in QUESTION 2.3.1. (3)
[9]

2.4 Study the diagram below and answer the questions that follow.



- 2.4.1 In which region of the kidney would you find this structure? (1)
- 2.4.2 Name the process in urine formation that occurs in this structure. (1)
- 2.4.3 Identify part C. (1)
- 2.4.4 Describe TWO structural adaptations of part C for the process in question 2.4.2 above (4)
- 2.4.5 Part A is wider than part B, what is the importance of this? (2)
- 2.4.6 Name the hormone secreted when there is a shortage of water in A. (1)
- [10]

TOTAL QUESTION 2: 40 MARKS

Question 3

3.1 An experiment was performed in a laboratory to investigate the effect of the concentration of sucrose on the rate of cellular respiration in yeast cells. The following steps were followed:

- Four test tubes were used, each with a different concentration of sucrose.
- Test tube A had 100ml water and no sucrose was added, test tube B had 0,5g sucrose dissolved in 100ml in water, test tube C had 1g sucrose in 100ml water and test tube D had 1.5g sucrose in 100ml water.
- The same species of yeast was added to each test tube.
- A small amount of salt was added to each test tube to slow down the rate of cellular respiration.
- Each apparatus was allowed to stand for 10 minutes.
- The volume of gas produced by the yeast cells in each test tube was measured and the results were tabulated as shown below.

Volume of gas produced by the yeast cells (mℓ)				
Time (min)	0 g sucrose per 100 mℓ	0,5 g sucrose per 100 mℓ	1 g sucrose per 100 mℓ	1,5 g sucrose per 100 mℓ
0	2,0	2,0	2,0	2,0
1	2,0	2,1	2,2	2,8
2	2,0	2,2	2,4	3,0
3	2,0	2,4	2,6	3,1
4	2,0	2,6	2,9	3,4
5	2,0	2,8	3,0	3,7
6	2,0	3,0	3,6	4,6
7	2,0	3,5	4,0	5,5
8	2,0	3,8	4,6	6,7
9	2,0	4,3	5,2	8,2
10	2,0	5,0	6,2	9,4

[Information adapted from <http://ngss.nts.org>]

3.1 Identify the:

- a) Dependent variable (1)
b) Independent variable (1)

3.1.2 Name the gas produced by the yeast cells. (1)

3.1.3 Explain how the investigators could test to verify the gas named in QUESTION 3.1.2 (2)

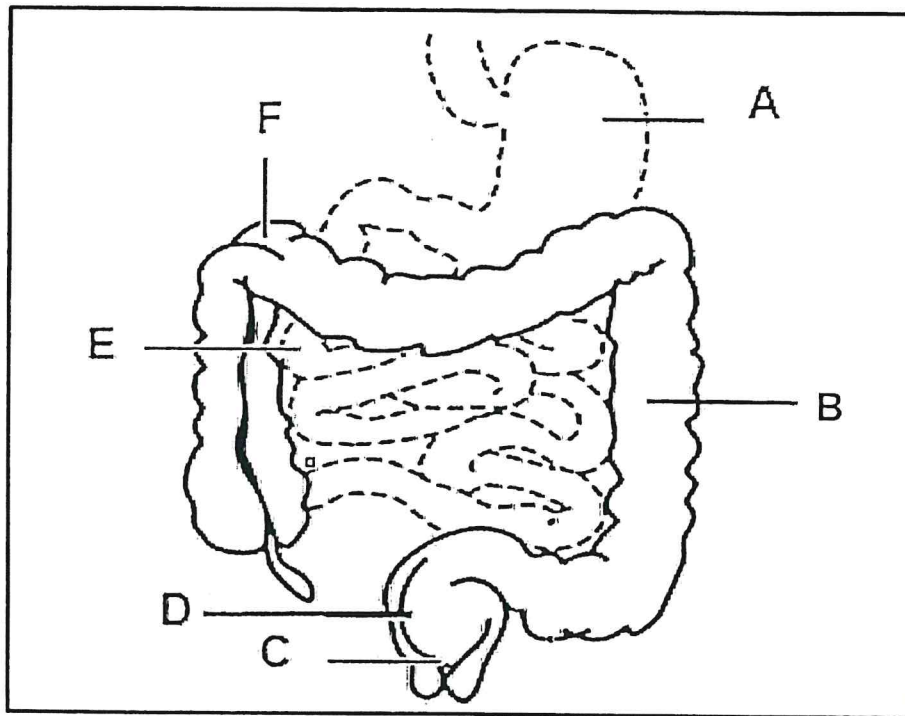
3.1.4 Name TWO ways in which the investigators could have increased the validity of this investigation. (2)

3.1.5 Explain the significance of the inclusion of test tube A in the experiment. (2)

3.1.6 What conclusion can be made based on the information in the table? (2)

[11]

3.2 Study the following diagram about a part of the human digestive system.



3.2.1 Give labels to the following parts:

- a) A (1)
- b) B (1)
- c) D (1)
- d) E (1)

3.2.2 Give the LETTER of the part with the following function or characteristic:

- a) Responsible for absorption of most water (1)
- b) Responsible for breaking down of food molecules by mechanical and chemical digestion. (1)
- c) Contains the sphincter muscle responsible for controlling defecation. (1)

3.2.3 Draw a labelled diagram of structures in E responsible for the absorption of digested molecules. (4)

3.2.4 Describe the homeostatic control of glucose levels in the blood by the pancreas. (4)

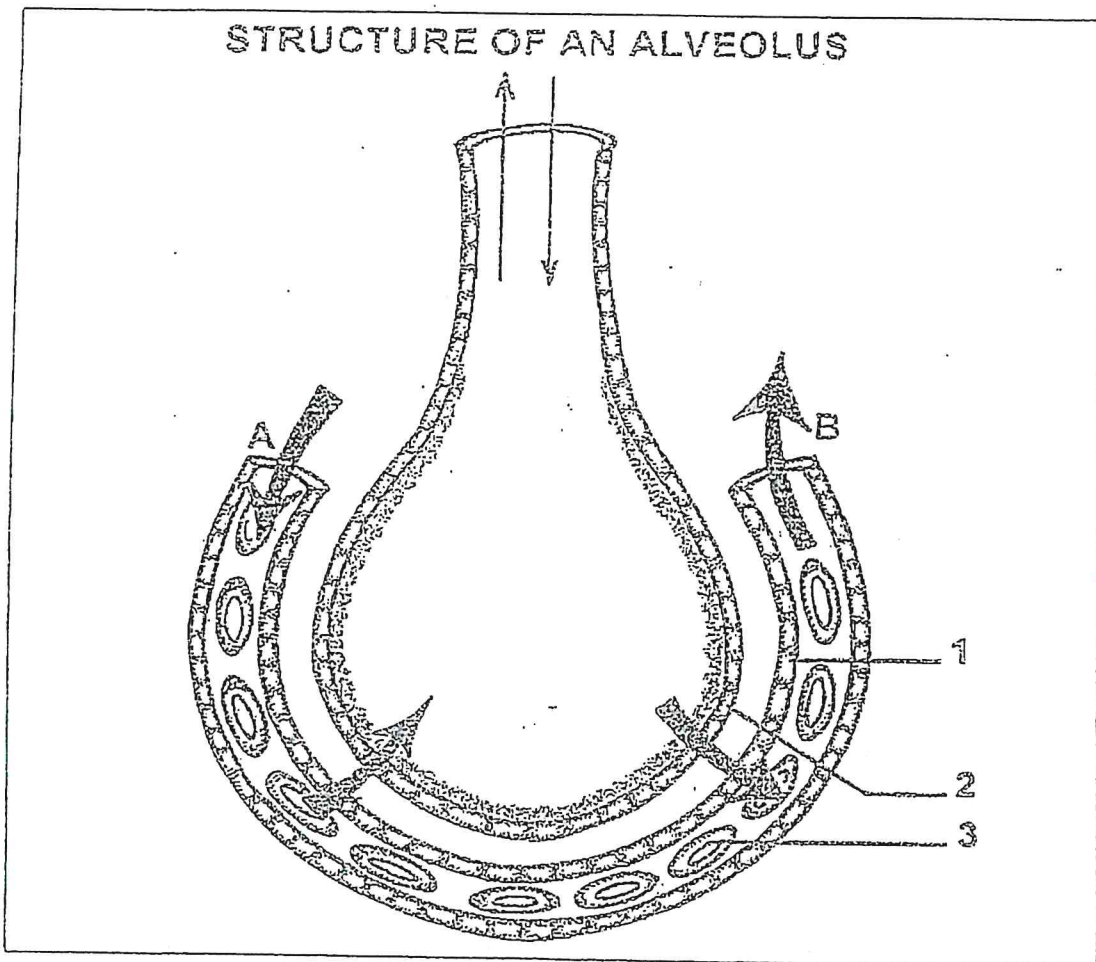
[15]

3.3 The following table shows the volume of air inhaled by a person over a timeframe of 120 seconds.

Time (sec)	Volume of air inhaled (litres)
10	3,5
20	3,5
30	3,5
40	3,5
50	3,5
60	5,0
70	5,0
80	5,0
90	4,5
100	4,0
110	3,5

- 3.3.1 Use the information in the table to draw a line graph starting from 30 to 100 seconds. (5)
- 3.3.2 For how long did this person exercise? (1)
- 3.3.3 Explain your answer in QUESTION 3.3.2. (2)
- 3.3.4 Explain how the information in the table would be different if this person suffered from asthma. (1)
- [9]

3.4 The diagram below represents a section through an alveolus and a surrounding blood capillary in the human body. Study the diagram and answer the questions that follow.



3.4.1 Name the type of epithelial tissue numbered 1. (1)

3.4.2 Identify the blood cell labelled 3. (1)

3.4.3 What pigment is found in the cell mentioned in QUESTION 3.4.2? (1)

3.4.4 Which type of blood:

a) Enters the blood capillary at A? (1)

b) Leaves the blood capillary at B? (1)

[5]

TOTAL QUESTION 3: 40 MARKS
GRAND TOTAL: 120 MARKS

